Attorney Docket No.: LSCP 1000-1

AF/3739

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Amy Jonsson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	Group Art Unit: 3739
Steven C. Murray et al.	
Application No. 09/589,675	Examiner: Ahmed M. Farah
Confirmation No. 8651	
Filed: 07 June 2000	**CUSTOMER NO. 22470**
Title: **Device for Irradiating Tissue**	

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TRANSMITTAL OF APPEAL BRIEF

Sir:

In connection with the above-referenced U.S. patent application, transmitted herewith is the following:

[X] **Appeal Brief,** in triplicate;
[X] **Check No. 3490 in the amount of $250.00,** in payment of the Appeal Brief filing fee.

Should it be determined that additional fees are required, the Commissioner is hereby authorized to charge those fees to Deposit Account No. 50-0869 (Atty Dkt No. LSCP 1000-1).

Dated: 14 October 2005

Respectfully submitted,

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Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

This Appeal Brief is filed in triplicate in support of appellants' appeal from the Final Office Action, mailed 19 April 2005 in this case. A Notice of Appeal was mailed on 15 August 2005.

The appropriate fee as set forth in § 41.20 (b)(2) of $500.00 is covered in the enclosed check. Should it be determined that additional fees are required, the Commissioner is hereby authorized to charge those fees to Deposit Account No. 50-0869 (Attorney Docket No. LSCP 1000-1).

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(1) Real Party in Interest

The real party in interest is Laserscope, the assignee of record.

(2) Related Appeals and Interferences

There are no known appeals or interferences relating to this case.

(3) Status of Claims

Claims 1-33 are pending in this case.

Claims 6-8, 10, 15-21 and 26 have been allowed.

Claims 4, 24 and 25 have been objected.

Claims 1-3, 5, 9, 11-14, 22, 23, and 27-33 have been rejected; all of the rejections are subject to this appeal.

(4) Status of Amendments

No amendments have been filed subsequent to the Final Office Action.

(5) Summary of Claimed Subject Matter[1]

There are thirty-three claims, claims 1 through 33, of which eight claims are independent. Independent claims 1, 22 and 33 have been rejected, which are summarized below. Independent claims 6, 10, 15, 17 and 26 have been allowed.

The present invention describes an optical system 100 that includes a fluorescent element 202 for irradiating tissue (page 3, lines 1-3). A pump radiation source 106 is coupled to a device 104 by an optical fiber 108 and generates a pump radiation to the fluorescent element 202 (page 3, lines 20-24, and Fig. 2). The fluorescent element 202 is fabricated from a material that provides desired spectral characteristics of an emitted fluorescent light (page 8, lines 13-17). The radiation emitted from the fluorescent element 202 has sufficient fluence for use in therapeutic applications such as treatment of wrinkles, hair removal, tattoo removal and stretch marks (page 16, lines 16-22, and page 4, lines 6-10).

1 Per MPEP §1206, this "Summary of Invention" section of the Appeal Brief is provided only to enable the Board to more quickly review the application and does not limit the claims in any way.

In one embodiment, the fluorescent element 202 is fabricated from a solid material like a fluorochrome (page 8, lines 17-22). The fluorescent element 22 is positioned to receive the pump radiation from the pump source 106 that has a narrow spectral band so that the emitted radiation has a peak emission outside the narrow spectral band (page 14, lines 9-15, and Fig. 5). The fluorochrome absorbs a portion of the pump radiation where the pump radiation excites the fluorochrome, causing fluorescent element 202 to emit radiation (page 9, lines 20-23). The fluorescent element 22 emits spontaneous emission for producing a variety of therapeutically relevant wavelengths of diffuse light inexpensively (page 4, lines 15-18).

Independent claims 1, 22 and 33 are rejected in this application. These three claims are summarized below.

Claim 1

Claim 1 recites a device for irradiating tissue having absorption characteristics (Figs. 1 and 2). The first element of claim 1 includes a fluorescent element positioned to receive pump radiation having a narrow spectral band and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band, and at least a portion of which emitted radiation matches said absorption characteristics. The second element of claim 1 calls for the fluorescent element being adapted to deliver at least a portion of the diffuse emitted radiation toward a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect.

Claim 22

Independent method claim 22 recites a method for irradiating tissue having absorption characteristics. Claim 22 includes a similar limitation as the apparatus claim 1 in the third act that recites "delivering at least a portion of the diffuse emitted radiation to a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect". The first two acts of claim 22 are directed to additional functionalities that include "directing pump radiation within a narrow spectral band onto a fluorescent element" and "responsively generating radiation by spontaneous emission at the fluorescent element, the spontaneously emitted radiation being diffuse and having

peak emission outside said narrow spectral band of the radiation, and at least a portion of which emitted radiation matches said absorption characteristics".

Claim 33

Independent claim 33 recites a system for irradiating tissue having absorption characteristics. The system in claim 33 comprises an additional element of:

> *a redirector for redirecting at least a portion of the diffuse emitted radiation toward a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect.*

(6) Grounds of Rejection To Be Reviewed On Appeal

A. Claims 1-3, 5, 9, 11-14, 22, 23, and 27-33 are rejected under 35 U.S.C. §102(b) as anticipated by Kosa (USP 4,695,697).

B. Claims 28-32 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kosa in view of Anderson et al. (USP 5,735,8544).

(7) Argument

The issues on appeal include a number of art rejections based on alleged anticipation or obviousness.

A. The Rejection of Claims 1-3, 5, 9, 11-14, 22, 23, and 27-33 under 35 U.S.C. §102(b) as anticipated by Kosa is Improper

The Examiner has relied on Kosa in rejecting claims 1-3, 5, 9, 11-14, 22, 23, and 27-33. Applicants submit that this reference does not support the anticipation rejection.

To support a *prima facie* case of anticipation, a claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference. *Celeritas Tech., Ltd., v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998) (emphasis added). Whether a prior art reference anticipates a claimed invention is a question of fact. *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1281 (Fed. Cir. 2000). Applicants submit that the Examiner has misinterpreted the claims so as to in effect ignore the limitation "sufficient for therapeutic effect," in each of the independent claims, and has improperly alleged that that Kosa "inherently" directs spontaneously emitted radiation toward the target tissue, as required by the claims.

Finally, Applicant establishes that Kosa does not literally or inherently disclose emission "sufficient for therapeutic effect" as properly interpreted.

Kosa is briefly summarized below, followed by discussion of the claims. Kosa describes a laser monitoring system 10 that employs a tip assembly 22 for monitoring and controlling the system operation (abstract and Fig. 2). The purpose of the laser monitoring system 10 is to use the tip assembly 22 as a feedback mechanism which provides a fluorescent feedback signal back to a feedback signal detector 16 (column 9, lines 46–51). The feedback signal detector 16 receives the fluorescent feedback signal and generates an output signal to a control monitor 14, indicating the output power of the laser received at a lens 30 of the tip assembly 22 (column 9, lines 54-57). The fluctuation in the signal received by the control monitor 14 shows the relative temperature change that occurs at the lens 30 of the tip assembly 22 (column 9, lines 64-68).

The laser monitoring system 10 in Kosa is embodied in a larger laser-enhanced system, such as a transluminal angioplasty catheter system (column 7, lines 5–9). The laser monitoring system 10 includes a laser head 12 for transmitting a stimulated radiation to a beam splitter 19 (column 7, 46–50). The beam splitter 19 passes most of the incoming radiation through a focusing lens 21, the control monitor 14, and the tip assembly 22 (column 8, lines 1–11). The lens 30 in the tip assembly 22 includes a first surface for receiving the beam radiation and a second surface for discharging the beam radiation (column 13, lines 16–21). The lens 30 possesses properties that are sensitive to a beam radiation and temperature, thereby creating a feedback signal indicating certain conditions that exist, including the laser power being transmitted and the tip temperature (column 1, lines 25-31). The level of the feedback signal is indicative of the condition that exists at the tip, and particularly the level of laser power being transmitted through the system and the temperature change experienced by the lens 30 (column 11, lines 25-29). The use of the tip assembly 22 and associated laser catheter system is suitable for removal in the obstructions of blood vessels.

Claims 1 and 22:

1. The Examiner Erred in Claim Interpretation of the Limitation "Sufficient Fluence for Therapeutic Effect"

Claim 1 requires that the emitted radiation have fluence sufficient for therapeutic effect, as stated in the limitation reading:

> the fluorescent element being adapted to deliver least a portion of the diffuse emitted radiation toward a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect.

Kosa does not teach this limitation, and therefore, does not anticipate the claim. The Examiner's position, subject of this appeal, that Kosa anticipates the claim is based upon on incorrect interpretation of "sufficient for therapeutic effect." The Examiner's position on claims 1 and 22 reads as follows:

> *Kosa discloses a laser delivery system for irradiating tissue (see column 6, lines 45-54), the system comprising: a fluorescent element 22 positioned to receive a pump radiation having a narrow spectral band (see Fig. 1) and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse (see Figs. 2-8) and having a peak emission outside the pump radiation (see column 4, lines 37-45); wherein the fluorescent element is adapted to deliver at least a portion of the diffuse emitted radiation toward a tissue target.*

(Final Action, page 2)

This comment by the Examiner ignores the limitation "sufficient for therapeutic effect" altogether, taking the position that the claim reads on any "portion" of spontaneously emitted radiation. The Examiner explains his interpretation of the subject phrase as follows:

> *In response to the second argument, the applicant's written description, in particular page 6, lines 16-22, fails to clearly disclose, teach or suggest the fluence of diffused radiation that is considered to have a sufficient therapeutic effect as recited in the amended claims. Therefore, the added limitation is considered as being indefinite and would not place the claims in condition for allowance.*

(Final Action, page 6)

This comment by the Examiner shows that the phrase "sufficient for therapeutic effect" is being interpreted as reading on any amount of fluence of diffused radiation, no matter how small and inconsequential.

The Examiner's interpretation is wrong. Claim 1 includes the limitation in the last phrase of the second element which recites "said portion having sufficient fluence for therapeutic effect". The Examiner has not properly given patentable weight to this limitation by asserting that it is indefinite. The term "sufficient" has been interpreted by the Federal Circuit to provide a functional relationship that is considered to be definite. In *Moore U.S.A., Inc., v. Standard Register Company*, the Federal Circuit agrees that the term ""distance sufficient" limitation is a functional description that provides a complete, definite and accurate statement of what the spacing should be in a printer. *Moore U.S.A., Inc., v. Standard Register Company*, 229 F.3d 1091; 56 U.S.P.Q.2D 1225 (Fed. Cir. 2000). The fact that the spacing is not in numerical terms is irrelevant since a functional term such as this, so long as it is itself definite, is entirely appropriate. *Id.* That court reasoned that there is nothing wrong with defining the dimensions of a device in term of the environment in which it is to be used. *Id., citing Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1575-76, 1 U.S.P.Q.2d 1081, 1087-88 (Fed. Cir. 1986).

The Examiner has the burden to establish a *prima facie* case of anticipation by considering all claim limitations. The Examiner has ignored the claim limitation of "sufficient fluence for therapeutic effect" and therefore he has not established a *prima facie* of anticipation. If the examination did not produce a *prima facie* case of anticipation, the applicant is entitled to grant of the patent. *In Re Edward S. Lowry*, 32 F.3d 1579; 32 U.S.P.Q.2D 1031 (Fed. Cir., 1994). Consequently, applicants respectfully request the allowance of all claims in this application.

The specification of the present application clearly establishes the meaning of the phrase, "sufficient fluence for therapeutic effect". The limitation of "sufficient fluence for therapeutic effect" is inherent in the embodiments described in the specification, and supported by the description at page 16, lines 16-22 of the application as filed. The application logically explains the purpose of the device with a fluorescent element of the

present invention. Starting with the Background of the Art section on page 1, line 20, the application describes using a radiation source to irradiate a tissue target for dermatological therapies. In the Summary of the Invention section on page 4, beginning in line 6, a device includes a fluorescent element emits radiation having spectral characteristics *appropriate to the medical procedure* and the absorption characteristics of the target tissue, where the medical procedure includes treatment of wrinkles, tattoo removal and others (emphasis added). In the Detailed Description on page 5, lines 7-18, the specification provides description with respect to a graph as shown in Fig. 5 that a clinician may match the emission spectra to the absorption characteristics of the target tissue by selecting a device having a fluorescent element which produces the desired Stokes shift, i.e. the difference in an emission spectra of the fluorescent element and an absorption peak of the target tissue. Continuing on page 16, lines 16-22, the specification describes that the fluorescent device is used for various therapeutic applications, such as hair removal, hair removal and others. From the above characterization that (1) the fluorescent element emits radiation having spectral characteristics appropriate to the medical procedure, (2) the fluorescent device matches an emission spectra of the fluorescent element and an absorption peak of the target tissue, and (3) the use of fluorescent device for therapeutic procedures, one of ordinary skill in the art would discern that the fluorescent element delivers sufficient fluence for therapeutic effect. The court in *Moore U.S.A. vs. Standard Register Company* found the phrase "distance sufficient" to be clear. As described above in the specification, the phrase "sufficient fluence for therapeutic effect" is also clear.

Therefore, persons having skill in the art unquestionably understand the meaning of the term "sufficient fluence for therapeutic effect" in light of the specification herein.

2. The Examiner Erred in Reading the Limitation "the Diffuse Emitted Radiation Toward a Tissue Target" on Allegedly Inherent Disclosure in Kosa

There is no teaching, expressly or inherently, in Kosa about *diffusing the emitted radiation toward a tissue target* for any therapeutic effect as required in claim 1 (emphasis added). The whole idea in Kosa is to monitor the laser output power and the

surrounding temperature around the tip by providing a feedback signal to the laser device. There is no teaching in Kosa about directing the radiation emitted by the tip toward a tissue target for any purpose, much less for therapeutic effect. The radiation emitted by the tip in Kosa is used to generate a feedback signal to monitor the laser output level, as well as the temperature experienced at the tip. The Examiner argues at page 6 of Final Action that "due to the structure of fluorescing element 22, at least a portion of the emitted fluorescent radiation is inherently directed to the target issue". The operation of the system in Kosa is described at column 12, lines 46-65. There is no discussion in Kosa about delivering the spontaneously emitted radiation from the tip toward the target tissue. Contrary to the claims, Kosa teaches the transmission of the feedback signal back into the laser system, rather than projecting onward to a tissue target. Kosa does not describe a target tissue anywhere. The fluorescent radiation in Kosa is solely and explicitly used for sensing conditions, primarily the temperature, at the tip of a catheter. (See Kosa, Abstract; column 2, lines 14, 68; column 5, lines 48-56; column 9, line 64; column 10, line 3; column 12, lines 46-65). Thus, although the fluorescent light emitted by the tip in Kosa might be emitted toward a target tissue, it is not inherently so. One would have to know where the target tissue is, what fluid is between the target tissue and the tip, whether the emitted radiation can penetrate the fluid/lens interface without internal reflection and so on to know whether it is directed to target tissue.

The Manual of Patent Examining Procedure, Version 8, Revision 2, at Section 2112, provides the following guidance to Examiners on making an inherent anticipation rejection:

> *The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference" not merely probably or possibly present, in the prior art. In re Robertson, 169 F.3d 743, 745, 49 U.S.P.Q.2D (BNA) 1949, 1950-51 (Fed. Cir. 1999) (citing Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264, 1268, 20 U.S.P.Q.2D (BNA) 1746, 1749 (Fed. Cir. 1991)). In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic*

necessarily flows from the teaching of the applied prior art. Examiner parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original).

Kosa also does not teach a fluorescent element adapted to deliver at least a portion of the diffuse emitted radiation toward a target tissue. The Examiner's position does not set forth a reasoned basis for his assertion that that the emitted fluorescent radiation is inherently directed to the target issue. The Examiner's position is set out in page 6 of the most recent Office Action. The Examiner acknowledges that it is absolutely correct that Kosa uses *a backscattered fluorescent radiation* from a lens at the tip of the catheter to monitor the output or temperature (emphasis added). However, the teaching in Kosa is contrary to the Examiner's assertion that at least the forward scattered portion of the fluorescent radiation from the outer surface of the lens is directed to the target tissue. Kosa does not describe a target tissue as a destination for the emission of the fluorescent radiation. Rather, the lens at the tip in Kosa has a surface that is intended for discharging the fluorescent radiation back to the laser system rather than continuing on in a forward direction. Therefore, the Examiner has not provided a reasonable basis in fact or technical reasoning to support his assertion that the fluorescent radiation is directed at the target tissue would necessarily flows from the teaching in Kosa.

3. Properly Interpreted, Kosa Does not Teach the Claims

Suppose the Examiner had interpreted Claim 1 properly – that is, Claim 1 includes the limitation of "sufficient fluence for therapeutic effect". This limitation is missing in Kosa. There is nothing in Kosa that teaches the use of a device that delivers any fluence to the target tissue, much less sufficient fluence for therapeutic effect. The central concept that Kosa teaches is about an improved fiber tip that provides a monitoring mechanism in a laser system by monitoring a feedback signal from the tip. If the device in Kosa is used with a laser transluminal angioplasty catheter device, the combination is useful for removal of obstructions in blood vessels, which is drastically different than therapeutic treatment. Therefore, even if the Examiner had properly interpreted Claim 1, Kosa still does not teach the limitations in Claim 1.

Claims 2-3 and 5:

Claims 2-3 and 5 depend from claim 1, and further defines claim 1. The Examiner cited column 6, lines 55-66 in Kosa as anticipating these claims. Kosa describes an optical fiber laser beam delivery system employing a chromium ion-doped synthetic sapphire lens element, but Kosa does not teach "a fluorochromes dispersed in a solid medium" in Claim 2, "the solid medium is selected from a group consisting of a polymer and a glass" in Claim 3, or "a polymer selected from a group consisting of polymethyl methacrylate and polyvinyl toluene" in Claim 5. The Examiner has also failed to provide the basic requirement of a *prima facie* case of anticipation that Kosa teaches all of the elements of claim 1.

Claim 11:

Claim 11 depend from claim 1, and further defines claim 1 by reciting that "the pump radiation is generated by a frequency-doubled solid-state laser". Kosa does not teach a frequency-doubled solid-state laser generating the pump radiation. The Examiner argues that "Neodymium YAG lasers are commonly operated at the principle, 2^{nd} harmonic generation (frequency-doubled), 3^{rd} harmonic generation, etc." Although Kosa discloses Nd-YAG lasers on column 5, line 58, there is no teaching in Kosa about using a frequency-doubled solid-state laser. A Nd-YAG laser does not inherently configured as a frequency-doubled solid-state laser, even if they often are. The Examiner's position that claim 11 is anticipated by Kosa is therefore incorrect.

Claims 12 and 23:

Claims 12 and 23 depend from respective independent claims 1 and 22 and recite an additional limitation related to delivering the pump radiation to the fluorescent element through an optical fiber. Claims 12 and 23 are anticipated by Kosa, and stand or fall together with respective base claims 1 and 22.

Claims 14:

Claim 14 depends from claim 1, and recites an additional limitation related to a reflecting coating configured to reflect the emitted radiation toward the tissue target, the reflective coating being substantially transparent with respect to the pump radiation. The Examiner cited a fiber cladding film 33 in Kosa as the same element as the reflective coating. This assertion is erroneous. As shown in Fig. 2 and beginning on page 9, line 21, Kosa describes a conventional fiber-cladding film 33 that surrounds the core of fiber 20. The fiber-cladding film 33 in Kosa serves to confine the flow of radiation, which is not able to reflect the emitted radiation, as recited in claim 22 that a reflecting coating configured to reflect the emitted radiation.

Claim 27:

Claim 27 depends on claim 22 and further defines the tissue target that comprises a vascular lesion. Claim 27 is anticipated by Kosa, and stands or falls together with the base claim 22.

Claim 33:

Claim 33 is an independent claim that recites in the third element that "a redirector for redirecting at least a portion of the diffuse emitted radiation toward a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect". The Examiner asserts that "a portion of the spontaneously emitted radiation from the fluorescent element is reflected back to the optical fiber. The boundary between the optical fiber core and cladding material in turn reflects at least a portion of said reflected radiation back to the target tissue." As shown in Fig. 2 and beginning on page 9, line 21, Kosa describes a conventional fiber-cladding film 33 that surrounds the core of fiber 20. The fiber-cladding film 33 in Kosa does not redirect the diffuse emitted radiation toward a tissue target. Instead, the fiber-cladding film 33 serves to confine the flow of the emitted radiation.

B. The Rejection of Claims 28-32 under 35 USC §103(a) as being unpatentable over Kosa in view of Anderson et al. (USP 5,735,8544) is Improper

Claims 28 through 32 depend on claim 22, and add various limitations related to the different types of the tissue target. The Examiner states that Anderson et al. "an Nd:YAG laser (see column 9, line 6) for generating a treatment energy; and optical fiber adapted to deliver the treatment/laser energy to a delivery tip". None of the two references (Kosa or Anderson et al.) teaches or suggests all of the elements in the base claim 22, which recites the limitation of "delivering at least a portion of the diffuse emitted radiation to a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect". The combination of the two references is insufficiently motivated to render the claims obvious. Kosa teaches monitoring the temperature and the laser output power at the lens. It is not clear why one of ordinary skill in the art would apply the cooling technique in Anderson et al. to the lens in Kosa, given that the lens serves as a sensor for detecting the temperature experienced at the lens. Nevertheless, assuming *arguendo* that the combination of references is proper, the mere combination of Kosa and Anderson et al. fails to teach or suggest directing spontaneously emitted radiation toward the target tissue and delivering sufficient fluence for therapeutic effect.

CONCLUSION

In view of the foregoing, appellants ask that this honorable Board reverse the Examiner's rejections of the claims.

If a telephone conference would expedite this appeal, please telephone the undersigned at 650.712.0340.

Respectfully submitted,

Dated: October 14, 2005

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CLAIMS APPENDIX

1. (previously presented) A device for irradiating tissue having absorption characteristics, comprising:

a fluorescent element positioned to receive pump radiation having a narrow spectral band and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band, and at least a portion of which emitted radiation matches said absorption characteristics; and

the fluorescent element being adapted to deliver least a portion of the diffuse emitted radiation toward a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect.

2. (previously presented) The device of claim 1, wherein the fluorescent element comprises a fluorochromes dispersed in a solid medium.

3. (original) The device of claim 2, wherein the fluorescent substance includes fluorescent ions, and the solid medium is selected from a group consisting of a solid-state crystal and a glass.

4. (original) The device of claim 2, wherein the fluorescent substance includes a fluorescent dye, and the solid medium is selected from a group consisting of a polymer and a glass.

5. (original) The device of claim 4, wherein the solid medium comprises a polymer selected from a group consisting of polymethyl methacrylate (PMMA) and polyvinyl toluene (PVT)

6. (previously presented) A device for irradiating tissue, comprising:

a fluorescent element positioned to receive pump radiation having a narrow spectral band and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band; and

the fluorescent element being adapted to deliver at least a portion of the diffuse emitted radiation toward a tissue target, wherein the fluorescent element comprises a liquid fluorescent dye solution.

7. (original) The device of claim 6, wherein the dye solution is static.

8. (original) The device of claim 6, wherein the dye solution is continuously pumped through the fluorescent element.

9. (previously presented) The device of claim 1, including a diffuse reflector for redirecting at least a portion of the diffuse emitted radiation toward the tissue target.

10. (previously presented) A device for irradiating tissue, comprising:

a fluorescent element positioned to receive pump radiation having a narrow spectral band and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band; and

the fluorescent element being adapted to deliver least a portion of the diffuse emitted radiation toward a tissue target; and including a diffuse reflector for redirecting at least a portion of the diffuse emitted radiation toward the tissue target, wherein the diffuse reflector has a frustro-conical shape.

11. (original) The device of claim 1, wherein the pump radiation is generated by a frequency-doubled solid-state laser.

12. (original) The device of claim 1, wherein the pump radiation is delivered to the fluorescent element through an optical fiber.

13. (original) The device of claim 1, wherein the pump radiation is delivered to the fluorescent element through an articulated arm.

14. (previously presented) The device of claim 1, including a reflective coating configured to reflect the emitted radiation toward the tissue target, the reflective coating being substantially transparent with respect to the pump radiation.

15. (previously presented) A device for irradiating tissue, comprising:

a fluorescent element positioned to receive pump radiation having a narrow spectral band and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band; and

the fluorescent element being adapted to deliver at least a portion of the diffuse emitted radiation toward a tissue target, further comprising a substantially transparent window having a proximal face positioned adjacent to the fluorescent element and a distal face for contacting the target.

16. (original) The device of claim 15, further comprising means for cooling the window.

17. (previously presented) A device for irradiating tissue, comprising:

a fluorescent element positioned to receive pump radiation and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having substantially different spectral characteristics with respect to the incident radiation; and

a redirector for redirecting at least a portion of the diffuse, spontaneously emitted radiation toward a tissue target, wherein the redirector comprises a waveguide including a reflective entrance face and reflective walls, the entrance face having a substantially transmissive aperture formed therein for admitting pump radiation into the waveguide.

18. (original) The device of claim 17, wherein the reflective walls comprise a boundary between a waveguide core having a relatively high index of refraction and a cladding material having a relatively low index of refraction, the boundary causing total internal reflection of a portion of the emitted radiation.

19. (original) The device of claim 17, wherein the reflective walls comprise a reflective coating.

20. (original) The device of claim 17, wherein the reflective walls comprise a metallic coating.

21. (original) The device of claim 17, wherein the reflective walls comprise a dielectric coating.

22. (previously presented) A method for irradiating tissue having absorption characteristics, comprising:

directing pump radiation within a narrow spectral band onto a fluorescent element;

responsively generating radiation by spontaneous emission at the fluorescent element, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band of the radiation, and at least a portion of which emitted radiation matches said absorption characteristics; and

delivering at least a portion of the diffuse emitted radiation to a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic effect.

23. (original) The method of claim 22, wherein the step of directing incident radiation onto the fluorescent element includes directing incident radiation through an optical fiber.

24. (previously presented) The method of claim 22, wherein the step of delivering includes receiving a portion of the emitted radiation at a redirector; and

redirecting the received portion of the diffuse emitted radiation by reflecting the emitted radiation from a diffuse reflector toward the tissue target.

25. (previously presented) The method of claim 22, wherein the step of delivering includes receiving a portion of the emitted radiation at a redirector; and

redirecting the received portion of the diffuse emitted radiation by reflecting the emitted radiation from a reflective coating, the reflective coating being substantially transparent with respect to the pump radiation.

26. (previously presented) A method for irradiating tissue having absorption characteristics, comprising:

directing pump radiation onto a fluorescent element;

responsively generating radiation by spontaneous emission at the fluorescent element, the spontaneously emitted radiation being diffuse and having spectral characteristics substantially different from the incident radiation, and at least a portion of which emitted radiation matches said absorption characteristics;

receiving a portion of the diffuse, spontaneously emitted radiation at a redirector; and

redirecting the received portion of the emitted radiation toward a tissue target for treatment of said tissue, wherein the step of redirecting the emitted radiation includes reflecting the emitted radiation from the boundary between a waveguide core and cladding material, the cladding material having a substantially lower index of refraction than the waveguide core, said portion having sufficient fluence for therapeutic effect.

27. (original) The method of claim 22, wherein the tissue target comprises a vascular lesion.

28. (original) The method of claim 22, wherein the tissue target comprises a tumor.

29. (original) The method of claim 22, wherein the tissue target comprises hair.

30. (original) The method of claim 22, wherein the tissue target comprises a pigmented lesion.

31. (original) The method of claim 22, further comprising the steps of cooling the tissue target.

32. (original) The method of claim 31, wherein the step of cooling the tissue target comprises:

providing a substantially transparent and thermally conductive window;

placing a face of the window in thermal contact with the tissue target and

cooling the window.

33. (previously presented) A system for irradiating tissue having absorption characteristics, comprising:

a pump radiation source for generating pump radiation having a narrow spectral band;

a fluorescent element positioned to receive the pump radiation and responsively generate radiation by spontaneous emission, the spontaneously emitted radiation being diffuse and having peak emission outside said narrow spectral band, and at least a portion of which emitted radiation matches said absorption characteristics; and

a redirector for redirecting at least a portion of the diffuse emitted radiation toward a tissue target for treatment of said tissue, said portion having sufficient fluence for therapeutic

effect.

34. (Canceled).

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EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.